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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Animal Husbandry Research Division

SPERM STUDIES AS A GUIDE IN FUR-ANIMAL BREEDING PRACTICE

INCREASING BREEDING EFFICIENCY BY SPERM SMEARS

Microscopic examination of material withdrawn after copulation from the vagina of a mink or fox is a valuable aid to efficient breeding practice. From such examinations the breeder can gauge the likelihood of a productive mating, and from it can detect sterile males. He is informed of conditions in time to correct the trouble and is therefore able to reduce the number of females not pregnant.

MATERIAL AND EQUIPMENT

The following equipment is necessary for sperm study:

Compound microscope
  2 objectives, 10X (16 mm.) and 43X (4 mm.)
  1 ocular, 10X
Spatula or small glass rod
Substage microscope lamp
Medicine dropper
Glass slide
Physiological salt solution
Catching cage

ASSEMBLING THE EQUIPMENT

Inexpensive spatulas may be purchased or may be homemade. To make a spatula, take a rod of cold-rolled steel or drawn steel about 1/4 inch in diameter and 9 inches long and hammer both ends flat. The flattened parts should be about 1 inch long. Then grind or file the flat ends until they are a trifle narrower than the rod, bend the tips upward, narrow the ends, and smooth the ends with fine sandpaper or emery cloth or buff on a wheel.

Another type of spatula can be made from a 6-inch length of No. 10 insulated wire with a solid core. Remove the insulation for 1-1/2 inches from one end and flatten end as previously described. A nail may also be used by driving one end into a wooden handle, removing the head, and flattening and finishing the exposed end. A glass rod 1/4 inch in diameter can be used if the end is smooth.

The physiological salt solution is prepared by taking a level teaspoonful of ordinary table salt and dissolving it in one quart of water. Use well water. Do not use distilled water or rainwater because the minerals contained in well water are an essential part of the solution. Tapwater is satisfactory if not chlorinated. A clean medicine dropper may be used to transfer this solution to the slide.

Clean some microscope slides. The common 1- by 3-inch slide is most convenient. After washing the slide, rinse it well with plenty of clean, warm water, and then dry it. A well-washed linen towel is best for use in drying the glass, as it will polish without leaving lint. Have the microscope ready. It is well to use a substage lamp, because it gives a uniform illumination and warms the stage of the microscope. Turn it on before the microscope is to be used.

TAKING THE SMEAR

The smear is best taken in a warm room -- temperature 70° to 90°F. Excessive cold or heat will stop the movement of even the most vigorous sperms. If the work must be done where the temperature is low, have the salt solution warmed to a little above blood heat, which is approximately 100°F. Warm the slide before putting the drop on it, and have the substage lamp under the microscope turned on to warm the microscope stage.

After the male and female have separated, catch the female. It has been found that a cage with a movable bottom is best for capturing minks, since they must be held firmly for best results. Raise the bottom until the animal is caught between top and floor; then place a board in front to prevent her from crawling along the floor. The base of the tail should be at the level of the top of the catching cage. Now open the end gate of the cage and take firm hold of the tail. This hold is important, for to elevate the tail it is necessary to keep the animal from crawling forward. Minks may be caught and held by an attendant. A net or a pair of tongs may be useful in catching and holding vixens.

Most breeders prefer to use the medicine dropper for mink and the spatula for vixens. It is important that the tip of the dropper be strong and that it be smooth. A few drops of saline solution are drawn into the dropper, the dropper is inserted into the vagina then the bulb is given a few quick squeezes to force the saline in and out of the vagina. The fluid is then withdrawn. The contents are placed on a slide for examination.

For vixens, transfer a drop of the physiological salt solution to the middle of a slide. Dip the spatula into this drop and then gently insert the wet spatula into the vagina. Do not insert it more than 2 inches in a vixen. When inserted, give the spatula a quarter turn and remove. Now immerse the tip of the spatula in the drop of solution on the slide to transfer the material removed from the vagina.

The tip of the spatula is then washed in ordinary water and wiped dry, so it will be ready for the next animal. It would be well to dip the spatula in a mild disinfectant before washing. If this is done, be sure to rinse it well as any disinfectant left on it would kill the sperms. Be very gentle in taking the smear; it is not necessary to scrape the sides of the vagina.

INTERPRETATION OF THE FINDINGS

As soon as the material from the vagina is transferred to the drop of salt solution on the slide, the preparation is ready to examine for live sperms. Place the slide under the microscope and focus. For routine examination involving only a quick look for motile sperms, a standard student microscope with a 10X ocular and 10X (16 mm.) objective is used. This combination gives a fairly large field with considerable depth of focus, so that no cover glass is necessary. Higher power and a cover glass are used for more careful study.

Because of the rough and tumble that usually accompanies copulation in minks, it is not always possible to know whether the male organ has entered the vagina. Sometimes the organ is withdrawn before ejaculation of semen. In either case the smear taken from the vagina will fail to show sperms or any of the fluids released. Only the usual vaginal cells are present if the male fails either to introduce the organ or, having gained intromission, to deposit semen. Other smears will contain all the accessory fluids that are released at ejaculation but no sperm.

Lack of sperm may be temporary or permanent. Experience indicates that spermless smears may be noted frequently at the beginning of the breeding season. A male that lacks sperm early in the season may later on be an excellent sire. Other smears may contain only dead or abnormal sperms. Abnormal sperms may lack tails, have broken tails, or have misshapen heads. If a given smear can be assigned to any of the types here described, it is well to breed again at once; otherwise, pregnancy will not result. Since some abnormal sperms are always found, do not discard a male unkess the abnormal sperms exceed 20 percent.

If live sperms are present, they will be seen in numbers, their vibrating tails presenting an unmistakable picture. Even at microscopic powers too low to enable one to see much detail, the movement of live sperms is easily detectable. The normal secretions in the vagina tend to kill sperms, so if the mating has lasted for an hour or more most of the sperms recovered will be dead. As soon as conclusions have been reached, the slide can be cleaned for further use.

If the slide is to be preserved for later detailed study, it is allowed to dry. Dry slides can be shipped to a laboratory for preparation and study. Such a study is not practicable for fur breeders, since technical training is required. Laboratory methods, therefore, will not be described here.

Examination of smears taken immediately after the animals separate will disclose the unsuccessful matings. Detecting them early will allow time to breed again before the season is over. Males that fail repeatedly to deposit sperms can be eliminated as sterile. By following this method, the number of missed pregnancies may be reduced and much labor saved.

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